

## Educational Outreach

### **Summer of Applied Geophysical Experience (SAGE)**

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SAGE is an intensive, four-week field-based geophysics course for upper-level undergraduates, graduate students, and professionals, including college and university faculty. Established in 1983, and the only course of its kind, SAGE attracts numerous applicants from the U.S. and abroad. The SAGE faculty is composed of Los Alamos staff members and university professors. Operating in the field, SAGE students learn to apply geophysical methods to a variety of basic and applied problems (for example, characterizing contaminated waste sites or solving stratigraphic and structural problems associated with the Rio Grande rift). The students also learn to use a variety of geophysical tools such as seismic refraction, seismic reflection, gravity, magnetics, ground-penetrating radar, electrical resistivity, and various electromagnetic methods, including magnetotellurics. Because we emphasize hands-on training in field techniques and teach students how to process and interpret data they themselves collect, SAGE extends and enhances the traditional classroom experience in geophysics, focusing on teaching and learning in a research-oriented environment.

### **The University of New Mexico–Los Alamos Volcanology Program**

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Volcanology is a significant scientific discipline used to address many nationally important problems such as natural hazards, energy, and the environment, and it has been a common thread in DOE-funded research at Los Alamos since the Laboratory's establishment. Since 1991, the University of New Mexico and EES Division have sponsored a joint volcanology program, which includes a number of volcanology courses. Staff from UNM and Los Alamos teach a field volcanology course every other year at Young Ranch near Cochiti Lake Village. This course attracts students from around the globe. UNM and Los Alamos also jointly teach an intensive summer course titled "Volcanoes and Human Affairs," which is held every other year primarily for science teachers from New Mexico. Other graduate and undergraduate courses are taught on an as-needed basis at UNM.

An additional goal of this project is to introduce basic volcanology to primary and secondary school science instructors to teach the value of complementary fields such as physics and meteorology. Volcanoes are second only to dinosaurs as a vehicle for introducing science to children. Five Los Alamos staff members participate in the program.

### **Improving the Grant Process for the NNSA/Nevada National Environmental Research Program at the Nevada Test Site**

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The DOE/Nevada Environmental Management program funds \$700,000 per year of applied research at Nevada universities through the National Environmental Research Program. A Nevada-based EES staff member serves as science advisor for this program and chairs the technical committee that reviews proposals submitted for funding. Recently, we revised the proposal review process so that it would be more similar to the process used by the National Science Foundation. We developed formal technical and programmatic review criteria, which we attach to the call-for-proposals sent to Nevada Universities. The technical review panel ranks all submitted proposals for technical quality and DOE/EM program managers rank the proposals for programmatic relevance. The science advisor and the DOE program manager assess progress in funded scientific work through on-site mid-year and year-end meetings with individual principal investigators at the University of Nevada, Reno, and the University of Las Vegas.

### **Atmospheric Radiation Measurement (ARM) Educational Outreach Program at the Tropical Western Pacific (TWP) Site**

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Our team manages educational outreach at the TWP site for the DOE's ARM program. Beginning in 1993, along with several educators, we began developing a basic science and climate-change program designed to enrich primary, secondary, and college science education in our host communities. In 1995, we began collaborating with the National Tidal Facility at Flinders University in Adelaide, Australia, and the South Pacific Regional Environment Programme on the island of Samoa to produce a science-enrichment curriculum for TWP schools. The curriculum, titled "Climate Change and Sea Level, Part One: Physical Science, and Part Two: Social Science," was issued in 1998. We also arrange educator workshops to review scientific material and provide sample classroom activities. So far, we have conducted three workshops for approximately 100 educators. Our first evaluation of workshop effectiveness indicated that 40% of the participants increased the number of science activities in their classrooms and 50% increased the number of hours of classroom time spent on weather or climate-change-related subjects. We will continue to evaluate the overall program and the workshops, and we are planning additional workshops in other countries in the area.